

3. Project Description

This chapter provides a detailed description of the modifications proposed for the Woodlawn Wind Farm project.

3.1 Approved Woodlawn Wind Farm project elements

The approved Woodlawn Wind Farm permits

- the construction and operation of 20 wind turbines
- approved generation capacity to 42 MW
- installation of external (kiosk-type) generator transformers at the base of each wind turbine tower
- site access works
- an equipment laydown area for temporary storage of equipment items during construction
- a construction site office to a central location on the main access track
- intra wind farm 33 kV collection circuits
- construction of 12 kilometres of 33 kV overhead line from Woodlawn Wind Farm to the Capital Wind Farm substation and a 33 kV/330 kV grid connection arrangement.

The approved Woodlawn Wind is shown in Figure 3.1.

3.1.1 Wind turbine design and specifications

The approved wind farm provides for the installation of 20 Suzlon S88 2.1 MW wind turbines which are mostly located along the elevated points of the ridgeline south from the Woodlawn mine void and Woodlawn Bioreactor site to within 800 m of the southern point of the Pylara property boundary (Figure 1.3).

As described in the previous assessments, each of the proposed wind turbines comprises a footing, tower, nacelle, hub and rotor with three blades (Figure 3.2). These components are briefly described below.

- **Tower** – this provides the supporting structure for the turbine. To facilitate its production and transport, the towers are manufactured in four sections which are assembled on-site. Each tower will be fitted with an internal ladder and/or lift to enable inspection and maintenance access to the nacelle
- **Footing** – the tower will be installed on a stub section installed in the reinforced concrete footing. The footing is likely to include ducting for cables and be rock-bolted to the underlying rock.
- **Turbine rotor** – the three bladed rotor and hub are attached to a steel shaft housed within the nacelle. Pitch motors enable the position of each blade to be adjusted for varying turbine operation. The hub and blade rotational joints will be enclosed and protected inside the nose cone.
- **Nacelle** – the nacelle is located at the top of the tower and encloses the gearbox, generator, motors, brakes, electronic components, wiring and hydraulic and lubricating oil systems. This cover protects the enclosed components from the various weather conditions and also provides noise damping for the mechanical and electrical parts. A central opening from the tower provides access to the nacelle for inspection and maintenance purposes.

Generator transformers will be located near the base of the towers on a small concrete slab and will be of a low visibility shade of brown. The selected transformers are oil filled, however containment measures are incorporated in the transformer footing design to prevent any oil loss, should it occur, from reaching local watercourses (Plate 3.1).

The specifications for the turbines and the generator transformers are summarised in Table 3.1

Table 3.1 – Summary of specifications for turbine components for the approved wind farm and for proposed modification

	Turbine Specification
Manufacture	Suzlon S88
Number of turbines	23
Output	2.1 MW
Turbine towers	
Height (hub)	80 m
Tower height (excluding nacelle)	78 m
Structure construction	Tubular steel with internal ladder, painted off-white
Weight	150 to 200 tonnes (4 sections)
Diameter – top (base)	2.5 m (4.5 m)
Number of sections	4
Footings	
Footing design	Reinforced octagonal concrete footing, secured with rock anchors
Dimensions	10 m diameter, 2-3 m below ground level
Rotors / Turbines	
Blade diameter	88 m
Sweep area	6,082 m ²
Rotation	15.5 rpm
Construction	Fibre reinforced plastic resin
Nacelle	
Dimensions	6 m long x 3 m wide x 3m high
Construction	Steel and fibre reinforced plastic
Generator transformer	
Dimensions	3 m x 2.5 m x 2.2 m

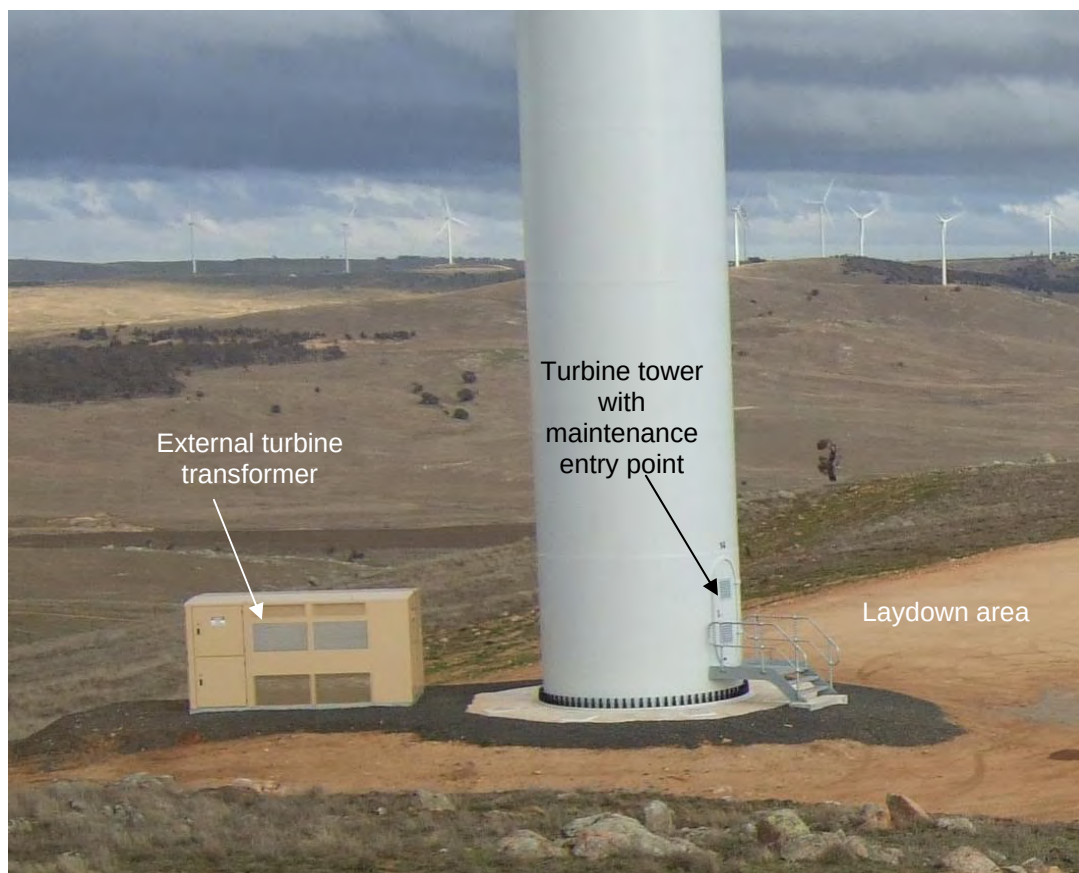


Plate 3.1 – External wind turbine transformers located at the base of the wind turbine

3.2 Modified Woodlawn Wind Farm

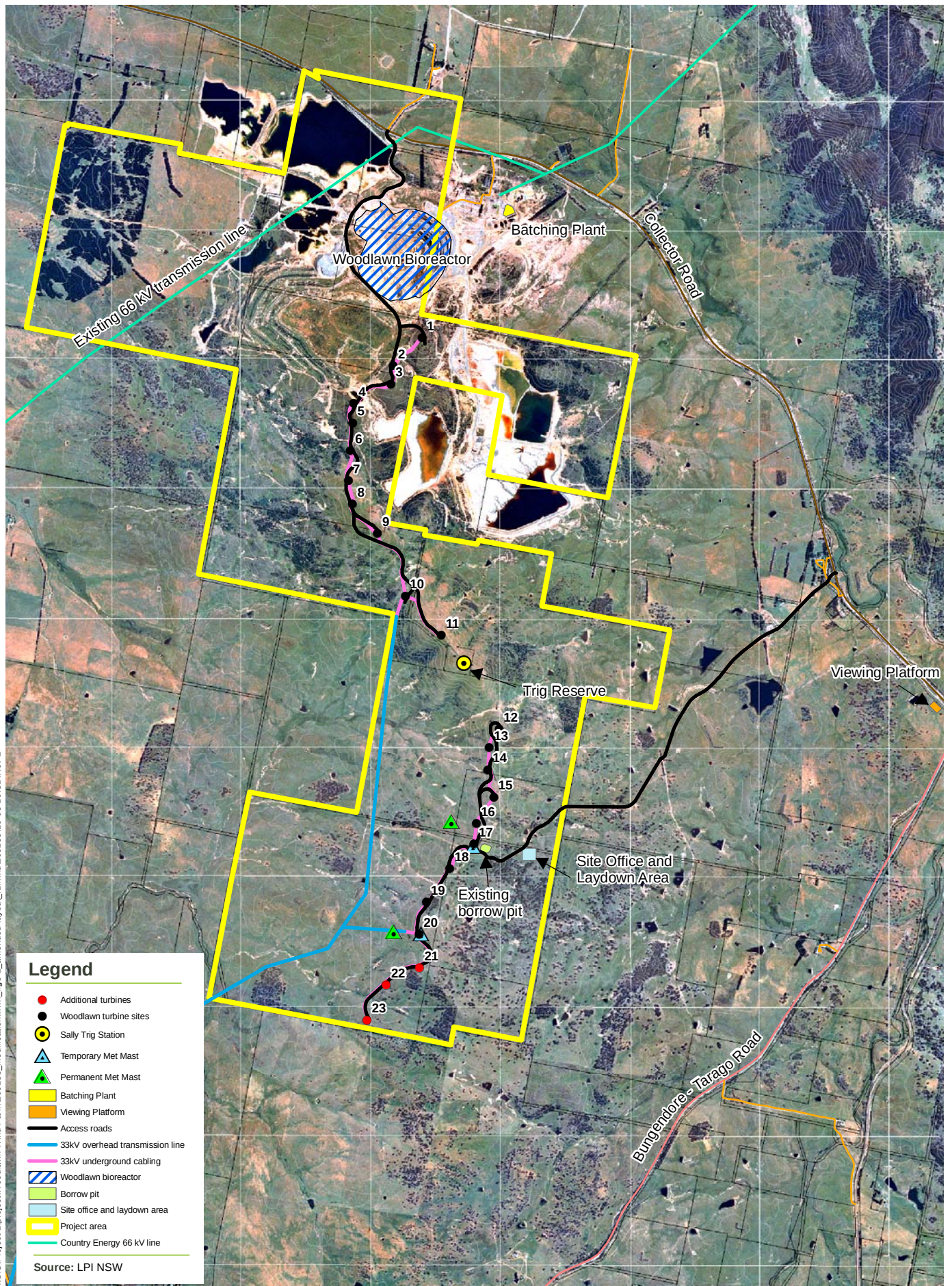
Woodlawn Wind Pty Ltd has proposed to expand the wind farm by the addition of three turbines to the southern array. The construction of the three additional turbines also includes associated kiosk transformers, underground reticulation, foundations, roads and hardstands for the additional turbines. The specifications for this equipment are identical to that described in the 2010 SEE. The location and associated additional ancillary works are shown in Figure 3.1.

3.2.1 Construction of wind turbine sites

The proposed installation of an additional three Suzlon S88 2.1 MW turbines would use the same construction methods that were described in the 2010 SEE. In summary, the construction will include:

- Excavation of a footing approximately 10 m by 10 m and 2-3 m deep for each turbine. Excavation for the turbine footings will be carried out by mechanical equipment.
- Construction of reinforced concrete footings on a flat concrete base using constructed formwork and an appropriately designed arrangement of steelwork and conduits for electrical and control cables. The concrete block will be about 2-3 m thick, tensioned and anchored to the underlying rock. The actual depth of excavation can vary depending on the nature of rock at individual sites. A thin concrete layer is laid down to cover irregularities in the underlying rock surface and provide a level base for construction of the footing.
- Construction of a level hardstand area approximately 30 m by 30 m adjacent each turbine location compacted with crushed rock to provide stability. These hard stand areas will be retained after construction to provide subsequent maintenance access for cranes and for laying down turbine components during maintenance activities.

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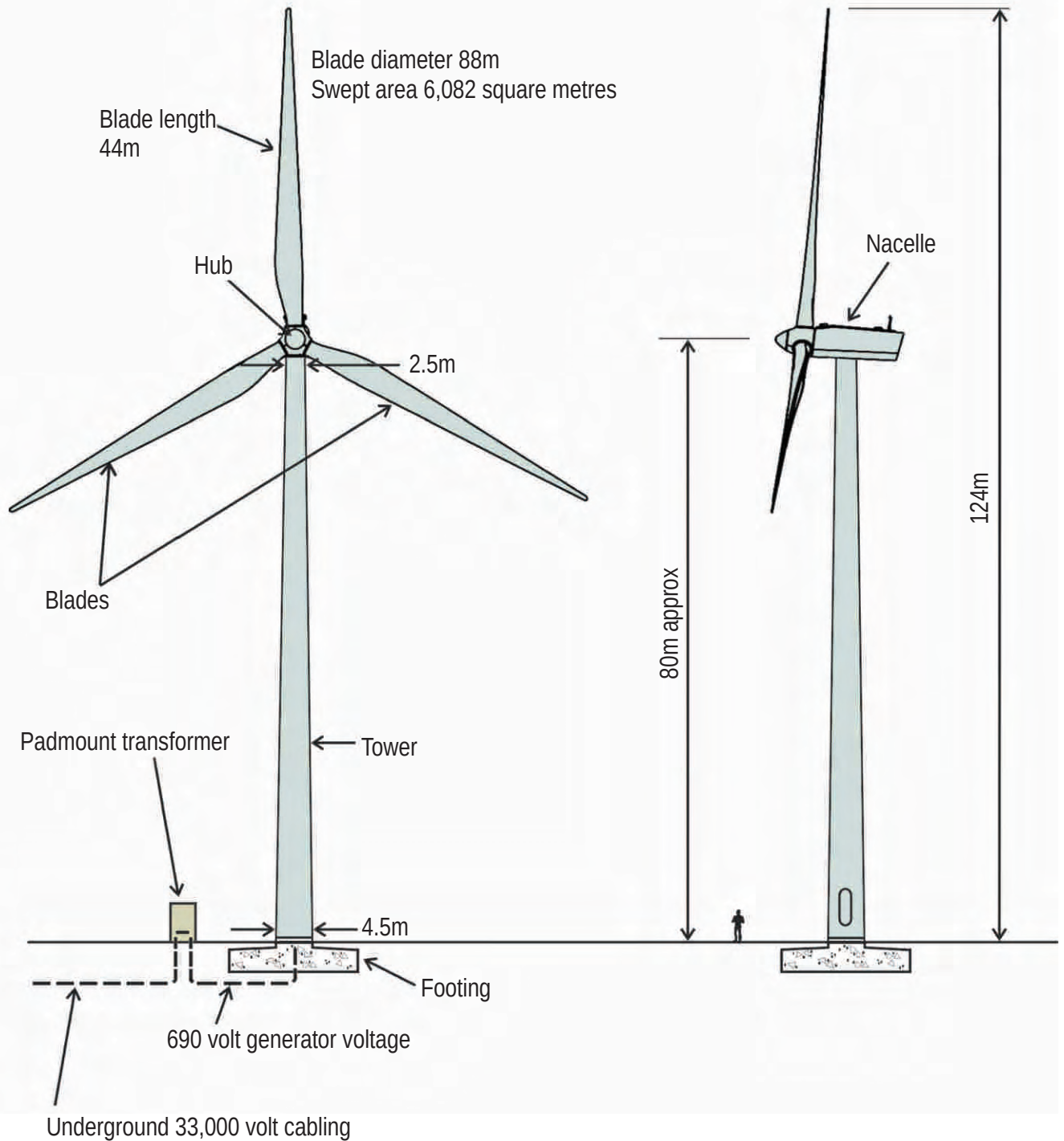
SCALE 1:40,000 @ A4

0 0.75 1.5km

Projection: MGA

Woodlawn Wind Farm **Supplementary Statement of Environmental Effects**

FIGURE 3.1 Amended Woodlawn wind farm layout including additional turbines



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- Topsoil from the footing and hardstand earthworks will be stockpiled separately adjacent to the excavation and will be used for backfilling over the temporarily disturbed ground following construction with the excess being evenly spread around the disturbed turbine site to support site restoration. Excavated material may also be used to prepare the level hard stand area. Any excess excavated material may be used elsewhere on the property (in consultation with the landowner) to rehabilitate existing areas of erosion. Rehabilitation of the disturbed areas will be undertaken at the completion of construction to prevent site erosion.
- Establishment of an external wind turbine generator transformer on a small concrete slab near the base of the towers. The selected transformers are oil filled and incorporate containment measures in the transformer footing design to contain the oil in the event of a leak.

3.2.2 Location of additional wind turbine sites

The proposed additional three wind turbine sites and connections to the approved reticulated transmission system will be located within the approved wind farm property boundaries and within the Pylara property (Figures 3.1 and 3.3).

Table 3.2 provides a summary of the property details for the locations of all 23 wind farm turbines. The locations of the previously approved turbines remain unchanged. The numbers in parenthesis is the proposed addition of turbines for the respective parcels of land.

Table 3.2 – Property details for wind turbine locations including the proposed modification

Lot	DP	Land title details	Turbine No's	Number of turbines (difference)
Veolia – (Woodlawn Farm)				10
Lot 92	DP 754919	13/92/754919	1	Unchanged
Lot 91	DP 754919	13/91/754919	2	Unchanged
Lot 14	DP 754919	13/14/754919	3 – 8	Unchanged
Lot 94	DP 754919	13/94/754919	9 – 10	Unchanged
Veolia – (Pylara Farm)				13 (+3)
Lot 21	DP 754919	13/21/754919	11	Unchanged
Lot 89	DP 754919	13/89/754919	12 – 13	Unchanged
Lot 27	DP 754919	13/27/754919	14 – 18	Unchanged
Lot 55	DP 754919	6054-107 (AC)	19, 20, 21, 22, 23	5 (+3)
TOTAL WOODLAWN WIND FARM				23 (+3)

3.2.3 Access to site

The approved access to the wind farm as shown in Figure 3.1 will not be affected by the proposed changes. Property details relating to the northern access route are included in Chapter 2 and Appendix C.

3.2.4 Internal access tracks

The proposed arrangement of tracks including the additional track required for turbines 21 to 23 is shown in Figure 3.3. Final locations will be determined based on design considerations, including grades, slope stability, erosion hazard, visibility and environmental constraints, however, the track layout remains essentially unchanged.

The access track for the additional three turbines will be constructed to a width of 10 m to enable movements of a large crane between turbine sites. The width of the track can generally be reduced following construction. Construction and maintenance of the access track will be subject to a Soil and Water Management Plan.

Further details of site access and delivery of large items to site are provided in Section 9.1.

3.2.5 Underground cabling

Each turbine is connected via permanent 22 kV underground cabling. The underground cabling required for the additional three turbines will be connected to turbine 20 (Figure 3.3). The location of trenches would generally be adjacent the access track between each turbine. As for the approved project, mechanical excavators would be used to excavate trenches 1.1 m deep and 0.45 m wide. Cables would be laid on sand and covered by a further layer of sand. The trench would then be backfilled with soil to surface level and rehabilitated to prevent erosion.

Underground cabling for the additional three turbines will be consistent with that described in the 2004 EIS and 2010 SEE.

Erosion prevention measures would be used to minimise storm water runoff where trenches were located on slopes. The trenching work will be addressed in the Soil and Water Management Plan.

3.2.6 Substation and grid connection

As described in the earlier SEE (Aurecon 2010) Woodlawn Wind Farm will connect to the Capital Wind Farm substation. The substation arrangement remains unchanged for the proposed modification, the subject of this supplementary SEE. The additional three turbines will connect to the southern grid via underground cabling to the cabling proposed at Turbine 20 (Figure 3.3).

3.2.7 Other site infrastructure

Table 3.2 provides a summary of other aspects of the approved wind farm that remain unchanged. These items, shown in Figure 3.2, are described in detail in the 2004 EIS and the 2010 SEE.

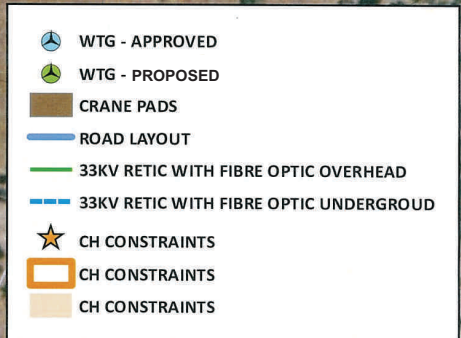
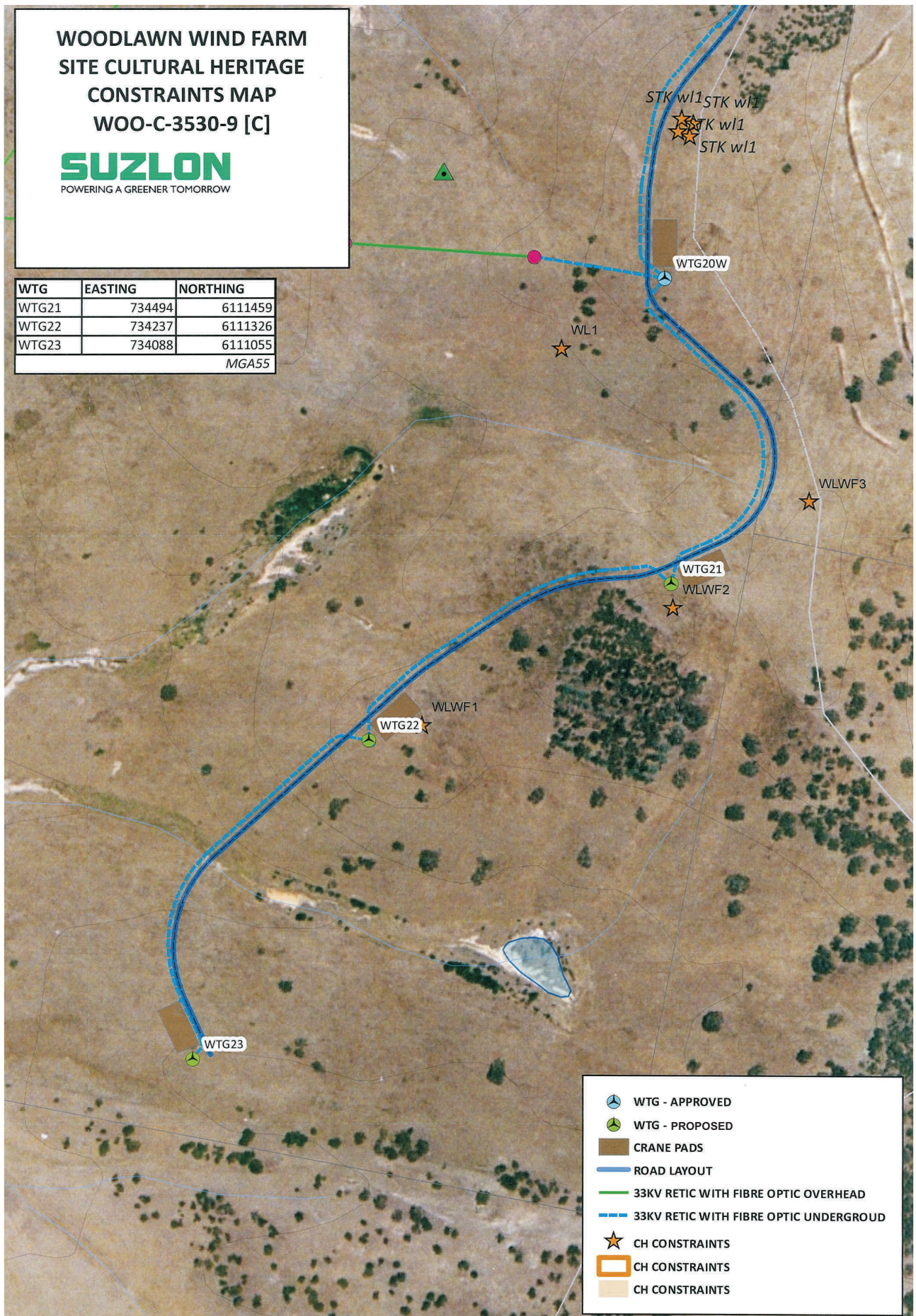
Table 3.3 – Approved wind farm infrastructure

Item	Location and Comment
Site office and laydown area	Located on the access road to the east of Turbine 18. The area will be fenced off with a designated parking area and will include a water tank, office space, toilets, meeting rooms and first aid rooms.
Quarry (borrow pit)	The existing borrow pit located approximately 60 m east of turbine 17 was approved as a source of gravel. An alternative site is also available on the Capital Wind Farm lands but may not be required if there is adequate suitable material at the Woodlawn Wind Farm site. The quarry is located on cleared, previously disturbed land. No additional vegetation clearing is proposed
Batching plant	Approval was granted for a batching plant to the north of the ridgeline near the Woodlawn mine site. The batch plant would only be used for a limited period when turbine footings are being poured and the contractor may choose to deliver concrete to the site from Bungendore as was done for the Capital Wind Farm. The option to source concrete on site or from Bungendore will be determined by the contractor prior to commencement of the construction phase.
Wind monitoring masts	Approval was granted for the dismantling of the two existing wind-monitoring masts and to construct two temporary and two permanent 80 m meteorological masts. The location of the new temporary masts will coincide with turbine locations 17 and 20.

WOODLAWN WIND FARM
SITE CULTURAL HERITAGE
CONSTRAINTS MAP
WOO-C-3530-9 [C]

SUZLON
POWERING A GREENER TOMORROW

WTG	EASTING	NORTHING
WTG21	734494	6111459
WTG22	734237	6111326
WTG23	734088	6111055
MGA55		



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SCALE
0 50 100m

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Figure 3.3: Access Tracks and Cabling Tracks for the Three Additional Turbines

3.2.8 Transport of equipment and materials

A large number of vehicles will travel to and from the site over the construction period. The vehicles include overmass and oversize vehicles associated with delivery of turbine components.

The traffic issues for the construction and operation of Woodlawn Wind Farm require consultation with Local Councils and the community and the development of a comprehensive Traffic Management Plan. It is proposed that the Traffic Management Plan developed for Woodlawn Wind Farm will largely reflect the procedures that were successfully applied for the Capital Wind Farm construction and will also use the approved route for the transport of equipment to Capital Wind Farm.

Section 9.1 reviews the anticipated volume of vehicles using the local roads during the construction and operation of the Woodlawn Wind Farm. This review considers the additional transport requirements of the three additional turbines.

The approved route for the transport of the turbine components is also discussed in Section 9.1.

3.2.9 Site clearing and restoration

Approval has been granted for preliminary site clearing for the construction of the access tracks, preparation of the turbine sites and installation of underground cables and the site office and laydown area. Similar site clearing and restoration activities will also be undertaken for the additional three turbine sites, as follows:

- any cleared vegetation will either be transferred to a green waste facility for recycling or used on site for mulching as part of the site landscaping works
- any topsoil removed during clearing would be stockpiled and reused during landscaping operations once construction is completed
- clearing activities will be undertaken in accordance with an approved Construction Environmental Management Plan (CEMP)
- rehabilitation of the site will be on-going with each turbine location rehabilitated as assembly is completed
- trenches will be backfilled and revegetated as soon as practicable after cable installation is completed
- waste and surplus materials will be removed from site progressively as practicable.

Ongoing maintenance and weed management of rehabilitated areas will be integral to the site restoration works.

3.3 Construction hours

The noise impacts of construction works were addressed in the 2004 EIS and are reviewed in the 2010 SEE. Construction activities are approved to occur during the following hours:

- Monday to Friday: 7am to 6pm
- Saturday: 7am to 1pm
- Sunday: No construction permitted (except as per Condition 19(a-c) of the Consent Conditions)

Due to the significant setback of the neighbouring rural residences from the wind turbine sites and the degree of mitigation of construction noise with distance, some construction activities may be carried out outside of these hours. This would involve works which would not be audible at any nearby residences outside the Premises.



Such activity would occur where suitable conditions are not available during approved working hours. The ability to erect turbines out of hours will assist in compressing the overall construction time, therefore reducing any impact of construction on neighbouring properties.

3.4 Employment

It was estimated that a maximum 45-60 construction employees would be on site at any one time for the 180 day construction period. The actual number at any point in time will vary with the stage of construction works and the contractors staffing arrangements. The construction of the additional three turbines will not impact on the number of construction employees proposed, but it is expected to extend the construction period by some 20 days.

No changes to the operational staff would be expected from the additional three turbines. An estimated three to four staff would manage the operational wind farm during normal working hours, with remote management capabilities available. Operations staff may be based at Capital Wind Farm substation and visit the Woodlawn Wind Farm site as necessary for inspections and maintenance.

The employment levels for construction and operation as indicated in the 2004 EIS are expected to remain generally the same for the modified project.

3.5 Wind farm development phases

Subject to approval of the proposed modification, the final design and construction arrangements will, if necessary, be updated to address the full set of consent conditions. This stage would also take account of any additional geotechnical investigations, updated wind resource monitoring and revised energy modelling. Any changes resulting from the addition of the three turbines would be expected to be of a minor nature, with no significant change to the environmental impacts.

The Project's CEMP will be developed by the project contractor in accordance with the Department of Planning's *Guideline for Preparation of Environmental Management Plans* and must be submitted to the Department of Planning for its approval. The Contractor will undertake the required construction works and equipment supply in accordance with the CEMP to ensure compliance and achieve the project environmental objectives. All sub-contractors will be required to address requirements of the CEMP in respect of the management of their component of the project construction works. The construction of the additional turbines will be undertaken in accordance with the CEMP.

The following development phases will take place.

- preconstruction compliance activities including gaining approval of the CEMP
- construction activities in accordance with the approved CEMP
- wind farm commissioning in accordance with the approved Operational Environmental Management Plan (OEMP)
- operation and maintenance of the wind farm
- decommissioning or replacement of wind turbine equipment

These activities have been addressed in the 2004 EIS and the 2010 SEE and are representative of the typical phases for the development. The sequence of activities and conduct of construction and operations activities is required to be consistent with the consent conditions.

3.5.1 Construction activities

The actual duration of construction works may vary depending upon the scheduling of activities such as site access and any delays that may be encountered due to factors such as unfavourable weather conditions or supply of equipment or materials.



The principal activities involved in the construction phase will include the following:

- site establishment
- transport of people, equipment and materials to the site by local roads
- earthworks for access track construction, turbine footing construction and cable trenches
- erection of 23 turbines and supporting structures
- underground cable and generator transformer installation
- grid connection works
- progressive commissioning of the turbines in conjunction with the wind farm commissioning sequence
- removal of temporary facilities and restoration of the site

There will be no significant changes to construction activities approved for the Woodlawn Wind Farm. Additional information is provided in the 2004 EIS (URS, 2004) and the 2010 SEE (Aurecon 2010).

Environmental management of construction impacts

The principal environmental issues associated with construction works for wind farm developments include:

- construction traffic management
- constraints on the location and extent of site earthworks and any clearing
- soil and water management
- dust control for road construction and soil stockpiles
- management of quarrying activities at the borrow pit adjacent to Turbine 17 and associated crushing plant if used. Lot 48 DP 754877 of Capital Wind Farm provides an alternative source. Delivery from off site sources would be addressed by the project traffic management plan
- management of issues associated with concrete batch plant if used
- construction noise controls
- fuel storage and handling
- waste storage, handling and disposal
- bush fire prevention
- coordination with property owners and effects on stock
- weed control and site restoration

Best practice environmental management requires that the environmental issues associated with construction projects are identified and managed in accordance with an Environmental Management Plan (EMP). These issues will be addressed in the CEMP.

Specific aspects of these issues related to the construction of the additional three turbines are outlined in the various chapters of the supplementary SEE and Chapter 10 provides a compilation of controls to be applied.

3.5.2 Wind farm commissioning

The commissioning process will include assessment of wind farm performance and compliance with the equipment specifications and the consent relating to operational aspects. The operation of the various components will be tested to ensure the wind farm's safe and reliable operation and equipment compliance with contract specifications and environmental requirements. Commissioning will commence after the substation and connection works have been completed and the substation transformer has been energised.

Due to progressive commissioning of the turbine groups, some turbines may be energised and operating under reliability test conditions while construction of others is still being completed. The commissioning of the three additional turbines would not be expected to significantly affect the overall commissioning time frame.



3.5.3 Operation and maintenance of the wind farm

Once commissioned, the wind farm will operate with a small on-site work force of about three to four staff. Additional visits by other technical staff will be made where assistance is required for inspection and routine or non-routine maintenance. Staffing will be managed to ensure continued safe and reliable operation and on site activities will occur in accordance with the OEMP. The addition of the three turbines will not result in any increase in this workforce.

3.5.4 Decommissioning of wind turbine equipment

At the end of its economic life the wind turbine equipment will either be replaced with comparable new equipment or the wind farm will be decommissioned. Decommissioning will involve dismantling and removal of the above-ground equipment and site rehabilitation. Access tracks may be retained depending on the landowner's wishes. This may also apply to the access tracks associated with the three additional turbines.